

## ABSTRACT

A semiconductor device is provided for the detection of a target DNA or RNA, for example for the detection of a mutation in a gene responsible for a genetic disorder, said device being composed of: (i) at least one layer of a conducting semiconductor such as doped n-GaAs or n-(Al,Ga)As; (ii) at least one insulating or semi-insulating layer such as of an undoped semiconductor, e.g., n-GaAs or n-(Al,Ga)As; (iii) at least one single-stranded DNA probe directly adsorbed on the surface of an upper layer which is either a conducting semiconductor layer (i) or an insulating or semi-insulating layer (ii); and (iv) two conducting pads on the upper layer making electrical contact with the conducting semiconductor layer (i), such that electrical current can flow between them at a finite distance from the surface of the device. In an alternative, the upper layer has no single-stranded DNA probe and such probe can be adsorbed on the upper layer by the user at will. The DNA probe may have a sequence complementary to a sequence of the target DNA or RNA, and the detection of the target DNA is carried out by hybridization with the probe and monitoring either the current change resulting from the hybridization process when a constant electric potential is applied between the two conducting pads or measuring the change in the electric potential required to keep a constant current. Also provided are arrays of said devices suitable for DNA analysis and detection.